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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/563,924

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Ingrid Annemarie Rink

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PHILIPS ELECTRONICS NORTH AMERICA CORPORATION
INTELLECTUAL PROPERTY & STANDARDS
370 W. TRIMBLE ROAD MS 91/MG
SAN JOSE, CA 95131

EXAMINER

VINH, LAN

ART UNIT

PAPER NUMBER

1792

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/563,924	Applicant(s) RINK ET AL.	
	Examiner LAN VINH	Art Unit 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-15 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>010906</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Chiu et al (US 7,078,351)

Chiu discloses a process for patterning a photoresist on a semiconductor device with a substrate 10 and a semiconductor body which comprises at least one active semiconductor element (col 4, lines 60-65) wherein, after the semiconductor element has been formed, a layered structure is provided comprising at least one electrically insulating layer 16, wherein an opening 19 is formed in the layered structure by means of a patterned photoresist layer (18) and an etch process (col 7, lines 5-10), wherein residues are formed at the surface of the semiconductor body during the etch process, wherein the photoresist layer is ashed, after the etch process, by means of a treatment with an oxygen-containing compound (col 7, lines 25-30), after which the surface of the semiconductor body is cleaned using a cleaning agent containing a diluted solution of an aqueous acid/ acid in water and being heated to a temperature above the room temperature for 5-10 minutes , as a result of which the residues formed are removed

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from the surface, characterized in that sulphuric acid is chosen for the acid in the cleaning agent (col 7, lines 15-20)

2. Claims 14-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Verhaverbeke et al (US 7,159,599)

It is noted that claims 14-15 drawn to an apparatus and the recitation of " for use in a method claimed in claim 1" and " is arranged for mixing of sulphuric acid between 0.01 and 10% by weight, and preferably between 0.5 and 5% by weight with demineralized water" are considered as intended use/functional language of the claimed apparatus that do not have patentable weight in these apparatus claims. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Danly, 263 F.2d 844,847, 120 USPQ 528,531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) Regarding claim 14, Verhaverbeke discloses an apparatus for processing wafer comprises:

- a reservoir 224 with concentrated sulphuric acid (col 9, lines 5-10; fig. 2A)

- a supply of DI/demineralized water (fig. 2A)

- a mixing unit 226 for mixing sulphuric acid provided by the reservoir and demineralized water provided by the supply thereby obtaining the cleaning agent (col 6, lines 1-5)

a cleaning station 200 for receiving the semiconductor body and the cleaning agent, the cleaning station being arranged to bring the semiconductor body in contact with the cleaning agent (col 5, lines 5-15; fig. 2A)

Since the apparatus of Verhaverbeke meets all the structural limitations of claims 14-15, the apparatus taught by Verhaverbeke would be structurally capable of "of " for use in a method claimed in claim 1" and " for mixing of sulphuric acid between 0.01 and 10% by weight, and preferably between 0.5 and 5% by weight with demineralized water"

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 6, 8-9, 11 rejected under 35 U.S.C. 103(a) as being unpatentable over Chiu et al (US 7,078,351) in view of Basi (US 4,116,714)

Chiu method has been described above. Unlike the instant claimed inventions as per claims 3, 6, 8-9, 11, Chiu fails to disclose using a cleaning solution comprises sulfuric and phosphoric acid, water, heating the diluted cleaning solution to a temperature in the range between 20 and 60°C, and preferably between 30 and 45°C, repeating the rinsing step 2-4 times after the cleaning step

Basi discloses a semiconductor cleaning process comprises the step of spray cleaning a semiconductor substrate using a cleaning solution comprises sulfuric and phosphoric

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acid, water, heating the diluted cleaning solution to a temperature in the range of 20 to 30 degree C, repeating the rinsing step after the cleaning step (col 2, lines 26-46, col 3, lines 15-30)

One skilled in the art at the time the invention was made would have found it obvious to modify Chiu method by using a cleaning solution comprises sulfuric and phosphoric acid, water to effectively clean the substrate and to produce haze-free surface as taught by Basi (col 2, lines 30-35). One skilled in the art at the time the invention was made would also have found it obvious to modify Chiu method by repeating the rinsing step, as taught by Basi, 2-4 times after the cleaning step in order to remove all the chemical residues on the semiconductor substrate

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chiu et al (US 7,078,351) in view of Uzoh (US 6,235,406)

Chiu method has been described above. Unlike the instant claimed invention as per claim 5, Chiu fails to disclose that the sulfuric acid concentration is between 0.5-5% by weight

Uzoh discloses a method of manufacturing semiconductor device comprises a step of cleaning semiconductor wafer with a solution including sulfuric acid and DI water wherein the concentration of sulfuric acid is between 2-8 % by weight (col 5, lines 35-40)

One skilled in the art at the time the invention was made would have found it obvious to modify Chiu by cleaning the semiconductor body with a solution including sulfuric

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acid and DI water wherein the concentration of sulfuric acid is between 2-8 % by weight as per Uzoh since Uzoh discloses that the sulfuric concentration of the cleaning solution is preferably between 2-8 % in DI water (col 5, lines 36-39)

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chiu et al (US 7,078,351) in view of Mohindra et al (US 6,352,082)

Chiu method has been described above. Unlike the instant claimed invention as per claim 10, Chiu fails to disclose rinsing the semiconductor body/substrate with hot, 70-75 degree C, demineralized water

Mohindra discloses a method of cleaning semiconductor wafer comprises a step of rinsing the semiconductor wafer with hot, 70-75 degree C, DI water/demineralized water (col 10, lines 15-20, col 19, lines 1-4)

One skilled in the art at the time the invention was made would have found it obvious to modify Chiu method by rinsing the semiconductor body/substrate with hot, 70-75 degree C, DI water as taught by Mohindra to promote drying of the semiconductor wafer

5. Claim 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yun et al (US 6,635,582) in view of Chiu et al (US 7,078,351)

Yun discloses a process for patterning a photoresist on a semiconductor device with a substrate 100 and a semiconductor body which comprises at least one active semiconductor element (112) (col 3, lines 28-36) wherein, after the semiconductor element has been formed, a layered structure is provided comprising at least one

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electrically insulating layer 114 , wherein an opening is formed in the layered structure by means of a patterned photoresist layer (134) and an etch process (col 3, lines 40-45), wherein residues are formed at the surface of the semiconductor body during the etch process (col 1, lines 20-25), wherein the photoresist layer is ashed, after the etch process, by means of a treatment with an oxygen-containing compound (col 3, lines 52-57), a tungsten/metal filled via 120 is formed which is contacted by an aluminum layer/track 122 leaving the tungsten 120 exposed (col 3, lines 30-42; fig. 6), the surface of the semiconductor device is cleaned with a wet cleaning solution (col 3, lines 55-60)

Unlike the instant claimed inventions as per claims 12-13, Yun fails to disclose using a heated cleaning agent containing a diluted solution of an aqueous acid/ acid in water and being heated to a temperature above the room temperature, characterized in that sulphuric acid is chosen for the acid in the cleaning agent (col 7, lines 15-20)

Chiu discloses a process for patterning a photoresist on a semiconductor device comprises a step of cleaning the semiconductor device using a cleaning agent containing a diluted solution of an aqueous acid/ acid in water and being heated to a temperature above the room temperature for 5-10 minutes , as a result of which the residues formed are removed from the surface, characterized in that sulphuric acid is chosen for the acid in the cleaning agent (col 7, lines 15-20)

One skilled in the art at the time the invention was made would have found it obvious to modify Yu method by cleaning the semiconductor device using a cleaning agent containing a diluted solution of an aqueous acid/ acid in water and being heated to a temperature above the room temperature for 5-10 minutes , as a result of which the

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residues formed are removed from the surface, characterized in that sulphuric acid is chosen for the acid in the cleaning agent as per Chiu because Chiu discloses that sulfuric acid mixtures are very effective in the residual free removal of highly postbaked resist (col 7, lines 20-25)

Allowable Subject Matter

6. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAN VINH whose telephone number is (571)272-1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Lan Vinh/
Primary Examiner, Art Unit 1792

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